INSTALLATION AND OPERATION MANUAL

FOR PELLET BOILER „CL 35”

TANGRA

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CE

Certificate
of conformity

Certificate Register No: 2012 – BSP – 01100000 – Z – 3013

TUV Rheinland- Bulgaria EOOD
Herewith certifies that the company

Certificate Holder: **„TANGRA-AV" OOD**
BG – 1331, Sofia
174, Evropa Blvd.
Bulgaria

Manufactures the product
Heating appliance, fired by wood pellets
Type : **CL-35,** Model : **One-way with hot water boiler**
Nominal power: **35 kW,** Efficiency at nominal power: **94 %**

In conformity with following documents:
Construction products (89/106/EEC),
Low Voltage Directive (2006/95/EC) and
Electromagnetic Compatibility Directive (2004/108/EC)

BDS EN 14785:2006,
BDS EN 60335-1:2003/A1:2005/ A2:2006/A11:2005/A12:2006,
BDS EN 60335-2-102:2006/A1:2010
BDS EN 61000-6-1:2007, BDS EN 61000-6-3:2007/ A1:2011

This certificate is based on the examinations referred to in Report No. **2012-BSP-01100000-I-3013-1/27.07.2012** and Test protocols **No. 766/ 11.06.2012**, **No. 690/ 20.06.2012** and **No. 12.0018/02.030/ 25.07.2012**. Copies of the them are available in TUV Rheinland Bulgaria EOOD.
It is an obligation of the manufacturer to affix the conformity marking on the product under strict observation of all valid requirements related to the product.

Validity: The certificate is valid from **2012.08.01** until **2017.08.01**
The year of first certification: **2012**

Dipl. Eng. R. FILIPOV

Sofia, 2012.08.01

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1. Safety instruction

This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.

The boiler is installed in separate rooms with floor and walls of fire-resistant material, with sufficient flow of fresh air.

The boiler is installed and works only in areas without high humidity. It is not acceptable to exposed the boiler to dripping or splashing water.

Cleaning the boiler is dry or lightly moistened with water or neutral detergent cloth. The use of abrasive or aggressive pochistvashi preparations.

Do not allow installation of the boiler on pallet.

Installation and putting into operation of the boiler must be carried out by trained and authorized by the manufacturer installers.

When connecting the boiler to the electrical supply, it should provide a tool of exclusion from power, which provides separation of contacts for all poles in terms of overvoltage category III. Appropriate tool is bipolar circuit breaker 6A 250V.

Connecting the boiler to the electric supply must be carried out by a specialist and with solid connection.

It is not allow using plug-type "Schuko" or other type of connection to the electrical supply.

Turn on/off the boiler is made from pole circuit breaker located in the power supply.

Turn on/off the boiler from the main supply to the boiler is done with the key that is located on the right of the control panel. This key is single-pola and provides on / off only of the phase conductor.

Functionaly turn on / off the boiler is done by pressing the On / Off key, which is located on the control panel.

If the power cable of the appliance is damaged, it must be replaced by the manufacturer, its service agent or a similarly qualified person to avoid danger situation.

Recommended once a week to check the combustion chamber and, if necessary, to clean the collected ash with the shovel and pan, included in the package.

Once a year is made mandatory maintenance, which includes testing of all systems, general cleaning of the burner, combustion chamber, heat exchanger tubes, and upper smoke collecting camera, check all connections for leaks, check all electrical connections, check the flexible hose for compressed air and pellets.

2. Description and main characteristics

„CL 35" is steel single-thread water pellet boiler equipped with electro pneumatic self-cleaning system.

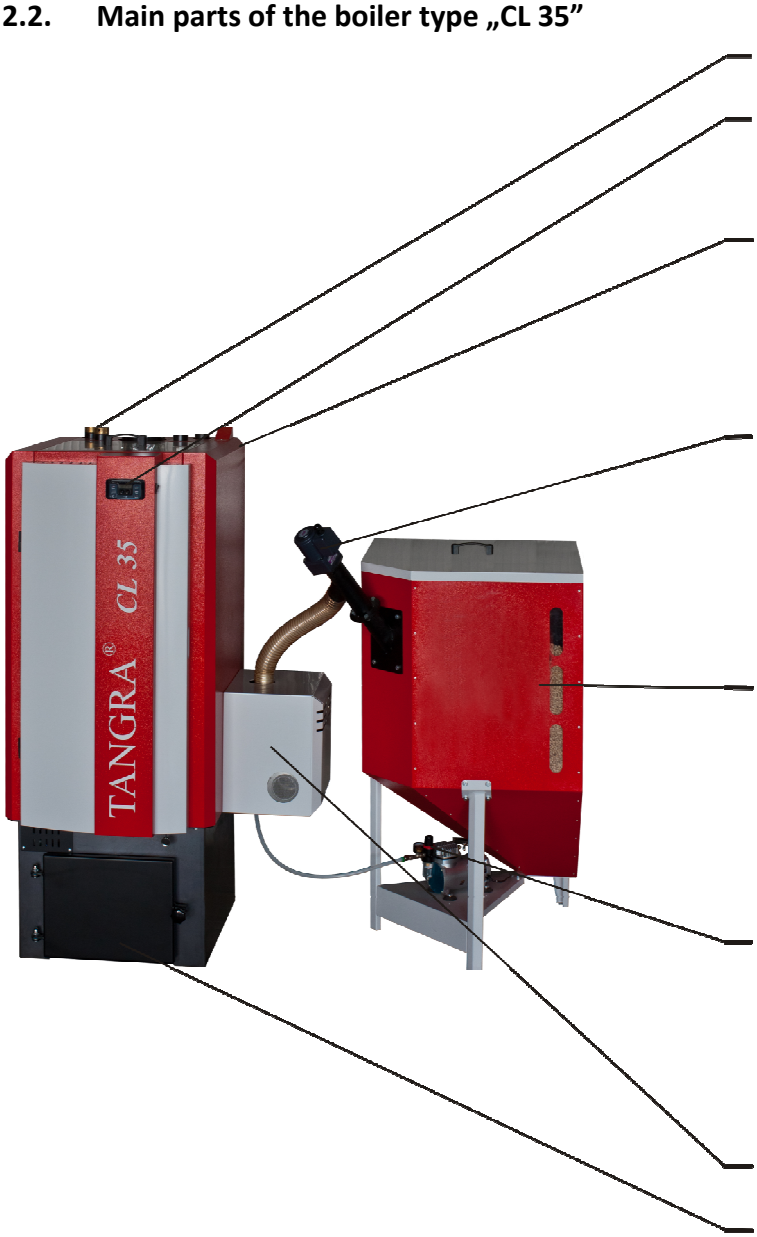
The boiler consists of two separate modules – boiler body and storage tank for pellets. As an option, it is possible to install ash collector for automated collection of the ash.

CL 35 is designed especially for heating systems in single family houses, small residential and office buildings, services, workshops etc.

2.1. Technical data

Parameter	Measure	CL 35
-	-	Value
Capacity	kW	17 - 35
Total weight	kg	170
Water volume	L	120
Flue gas connection	mm	150
Volume of the pellet storage tank	kg	220
Overall dimensions :B x L x H	mm	980/800/1300
Working pressure of water	Atm.	2
Boiler test pressure	Atm.	4
Recommended water working temperature	°C	80/60
Maximum water temperature	°C	90
Under pressure needed in the chimney	Pa	15
Joined dimensions – water in / out	"	1 ¼
Joined dimensions – drain connection	"	½
Power supply	V	220
Electrical capacity	W	550
Nominal electrical capacity	W	120
Protection degree	-	IP20
Efficiency	%	Up to 94

2.2. Main parts of the boiler type „CL 35”

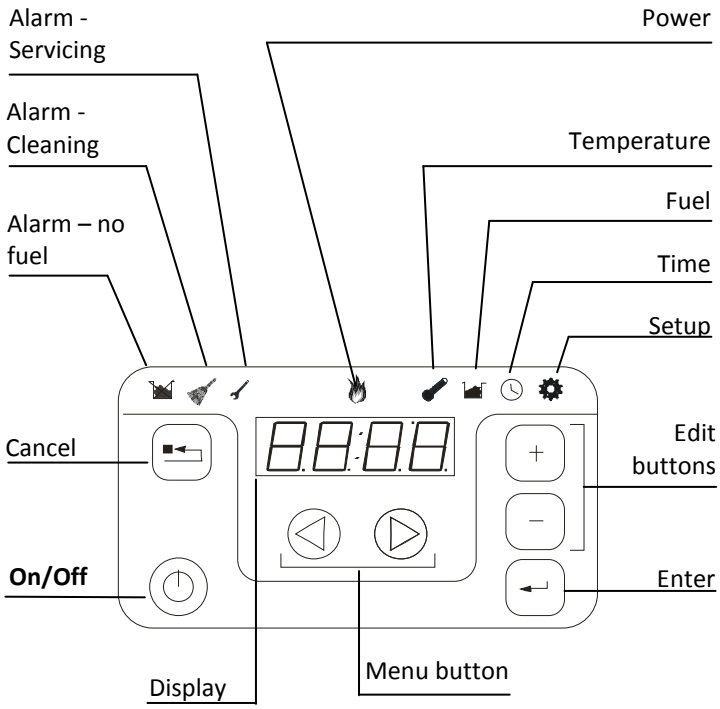


1) **Connections to the heating system;**
2) **Controller**;
3) **Boiler;**
4) **Auger for automatic supply of the burner with fuel;**
5) **Pellet storage tank;**
6) **Compressor;**
7) **Burner**;
8) **Ach collector (option)**

3. Requirements to the pellets – „CL 35” is designed to work with wood pellets, with diameter 6-8mm, length 5-30mm and moisture content – 5-9%.
With his integrated automatic burner cleaning system, as well as the module for forced cleaning of the burner, this boiler is not pretentious about the quality of the pellets. It works with all type of wood pellets intended for domestic usage, according to the **ÖNORM M7135, DIN 51731, DIN Plus standards**.
Regardless of the pellets, which are used, after correct adjustment of the combustion process could be reached efficiency of 90-94% and low emission of greenhouse gases CO, CO_2 and NO_X.
In case of changing the quality of pellets or the supplier during the exploitation, the parameters of the combustion process should be reset. This should be done only by authorized service organization.
There is a possibility to save up to three different setting for different quality of pellets.

4. Instruction how to work with the boiler:

4.1. Turn the boiler on/off – It is done by holding the button On/Off



TANGRA capacitive touch keyboard is designed for intuitive use.

Keep the keyboard clean. Any contamination could send signal for pressed button.

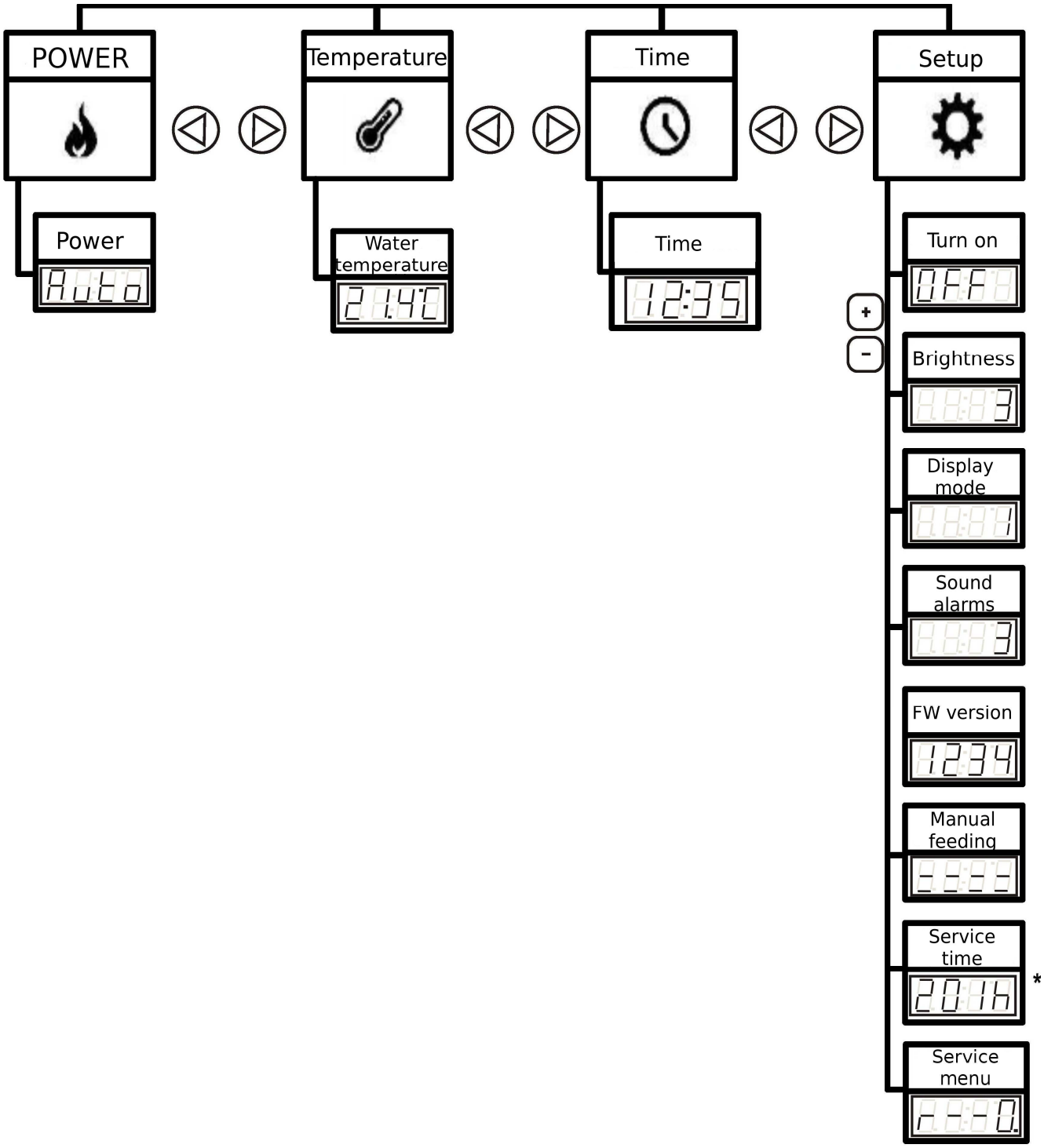
At the top of TANGRA keyboard are located indicators for various alarms and menus.

The display shows the set or current values for the currently selected menu option. With buttons you can navigate through the menu and control the operation of TANGRA controller. Refer to the Table on next page for descriptions of the buttons.

The following sound alarms are available:

- Short high tone: sounds when navigating the menu and editing the settings;
- Long low tone: sound in case of invalid operation (wrong button pressed);
- Long high tone: in case of alert, this tone sounds with the user defined loudness, and in case of an error, this tone sound with 100% loudness.

4.2. Scheme of the main menu:



4.3. Description of the menus

Capacity

Enter - current capacity is blinking - it is possible to change the capacity

\+

\-

Edit capacity

Enter - confirm the chosen capacity

Cancel

Possible values for Power:

- ***Auto*** - *maximum capacity and automatic regulation, according to the temperature in the boiler (modulation)*
- ***4***
- ***3***
- ***2***
- ***1*** - *minimum capacity*

Temperature

Enter - current temperature of the water in the boiler is blinking - it is possible to change the temperature

\+

\-

Edit temperature

Enter - confirm the chosen temperature

Cancel

Pellets quality:

- ***0***
- ***1***
- ***2***
- ***3***

Change the burning process, according to the previous set pellets quality.

Option

Time

Enter - current hour is blinking - it is possible to change the hour

\+

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Edit time

Current minutes are blinking - it is possible to change minutes

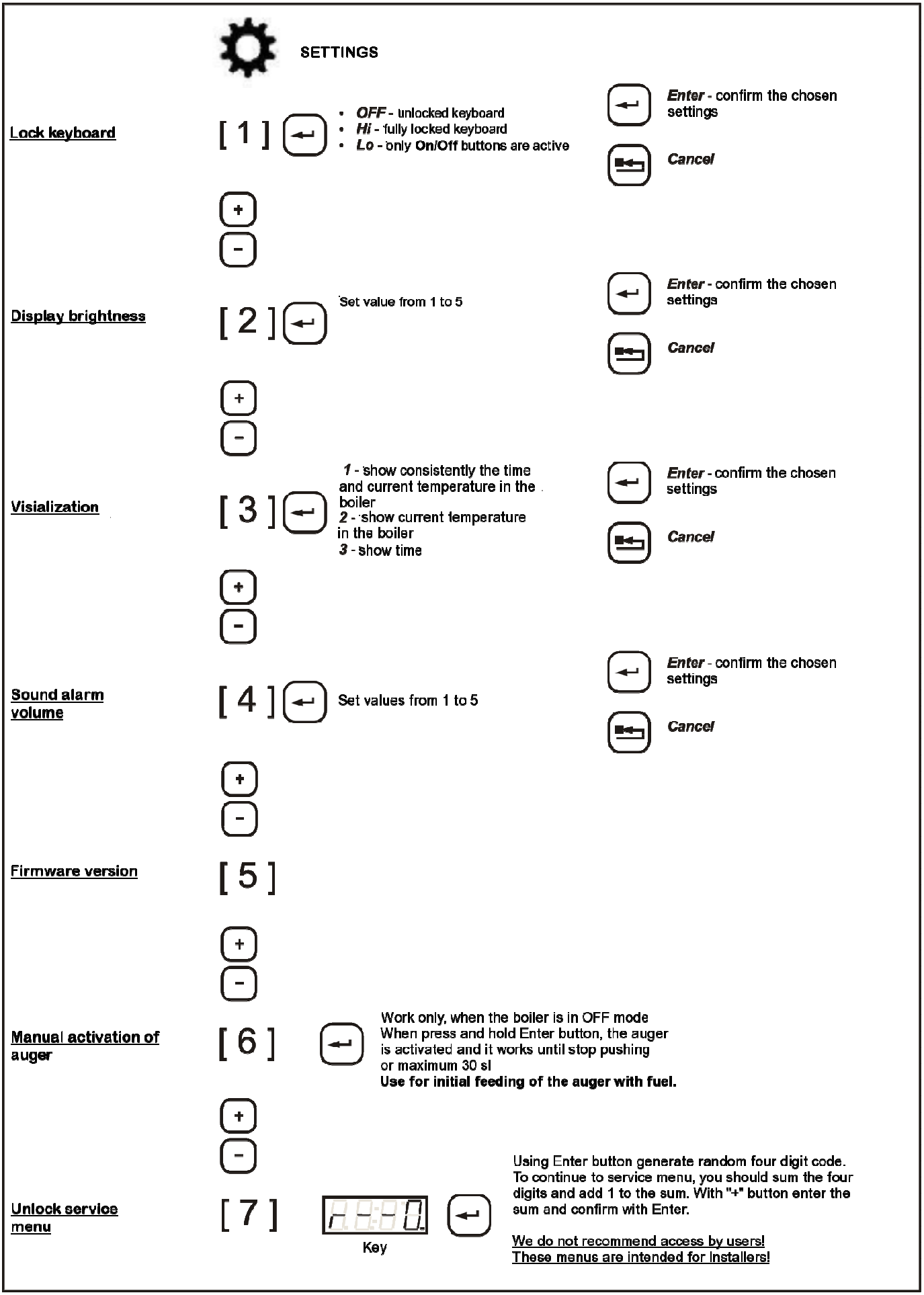
\+

\-

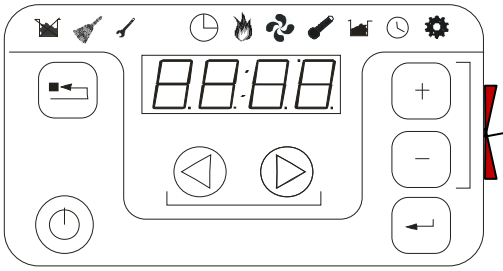
Edit minutes

Enter - confirm the chosen time

Cancel


SETTINGS
Lock keyboard
[1]
• OFF - unlocked keyboard
• Hi - fully locked keyboard
• Lo - only On/Off buttons are active
Enter - confirm the chosen settings
Cancel
Display brightness
[2]
Set value from 1 to 5
Enter - confirm the chosen settings
Cancel
Visialization
[3]
1 - show consistently the time and current temperature in the boiler
2 - show current temperature in the boiler
3 - show time
Enter - confirm the chosen settings
Cancel
Sound alarm volume
[4]
Set values from 1 to 5
Enter - confirm the chosen settings
Cancel
Firmware version
[5]
Manual activation of auger
[6]
Work only, when the boiler is in OFF mode
When press and hold Enter button, the auger is activated and it works until stop pushing or maximum 30 sl
Use for initial feeding of the auger with fuel.
Unlock service menu
[7]
Key
Using Enter button generate random four digit code. To continue to service menu, you should sum the four digits and add 1 to the sum. With "+" button enter the sum and confirm with Enter.
We do not recommend access by users!
These menus are intended for Installers!

4.4. Emergency boiler shutdown:



Emergency stop button should be used only in case of accident. *Turning the boiler off with the emergency stop button can affect the operation of the unit and it is not recommended by the manufacturer!*

5. Preventive maintenance:

5.1. Cleaning of the combustion chamber – accumulation of ash depends mainly of the quality of the pellets and operation hours of the boiler. The boiler is supplied with tray and blades to collect the ashes. We recommend once a week to check the amount of ash, collected at the bottom of the combustion chamber and if necessary to clean it.

5.2. Annual maintenance – this should be done once a year or after 5 tones of pellets are burned. The annual maintenance should be done by authorized organization. This includes testing of the systems and general cleaning of the burner, combustion chamber, pipes and upper flue gas chamber.

Annual maintenance is a compulsory part in connection with warranty service.

In case of rejection, incorrect work, alarm messages on the display you should contact your service provider and follow his instruction. You can also receive additional help and instructions from the manufacturer using the contacts mentioned below:

Tangra AV Ltd.

Address: 174, Europa Blvd.
1331 Sofia, Bulgaria
Phone: +359 2 9250610
www.tangra.bg
office@tangra.bg

6. GUARANTEE CONDITIONS

The manufacturer guarantee correct and flawless work of the unit when the installation and operating instructions are followed and the unit is installed from a certified by the manufacture company.

The guarantee starts from the date, when the guarantee card is filled and stamped. The guarantee card should be submitted in three copies, an original for the client and two copies, saved in the installation and manufacture companies. When the installation is complete the installer should return a copy of the guarantee card to the manufacturer.

THE GUARANTEE IS NOT VALID *in case of:*

- *Damages on the unit caused by incorrect storage, transportation not done by the manufacture company;*
- *Damages caused by nature disasters (earthquake, fire, flood, etc.);*
- *The instructions for installation, operation and maintenance are not followed;*
- *Repairs from the buyer himself or an unauthorized maintenance company;*
- *Changes in the construction of the unit;*
- *Units, which capacity is not correctly selected;*
- *Damages caused by unexpected factors, for which the manufacturer is not responsible.*

Every warranty repair should be documented in the guarantee card of the client and the installation company, which should inform the manufacturer for the repairs, if some part(s) need(s) to be changed.

Guarantee period is interrupted for the period of time from the claim until the repair of the damage.

The guarantee period of each unit is ***24 (twenty four) months.***

The guarantee period of hydraulic density of the unit is ***60 (sixty) months.***

The guarantee is valid if the customer presents the original guarantee card and the invoice.

SERVICE INSTRUCTION FOR PELLET BOILERS „CL 35”

1. Installation requirements

1.1. Requirements for the chimney – Water heating pellet boiler „CL 35” should be connected to the insulated system to take the flue gases off. This system should be made of non-combustion materials with minimum diameter ϕ150mm.

1.2. Requirements for the heating installation – The installation of the water heating boiler „CL 35” should be done only by qualified specialists, certified as installers by the manufacturer. According to BDS EN 303-5/2000 should be connected to the following systems:

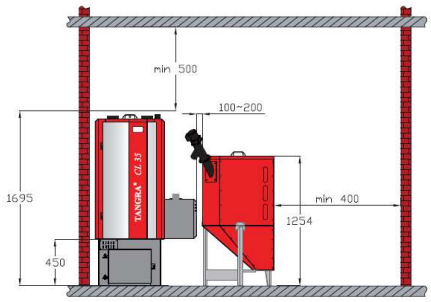
- High-temperature (until 90°C) closed water heating system with open or closed expansion tank, with maximum working pressure 2bar. When the system is supplied with closed **expansion tank, it should be with minimum volume 35 l and pressure safety valve up to 4bar.**
- Low-temperature (until 55°C) water heating system (under floor heating or fan coil units) closed or opened type. **Mixing unit should be installed in order to decrease the temperature of the water after the boiler..**

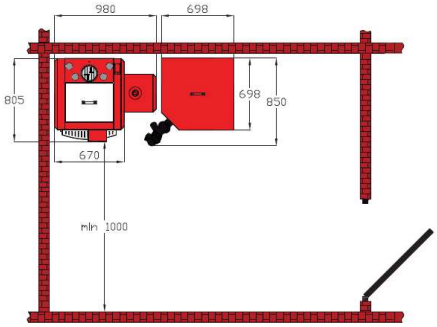
The boiler should not work with water temperature under 55°C. In this case the guarantee is not valid!

1.3. Requirements for the technical room

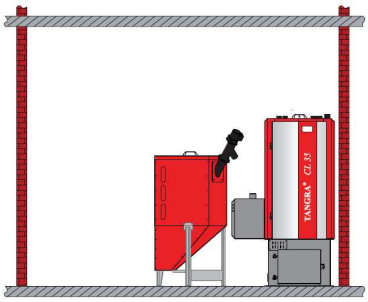
The pellet boiler „CL 35” should be installed in a special technical room, which floor and walls are made of non-combustion materials with good ventilation and enough quantity of fresh air for the combustion process.

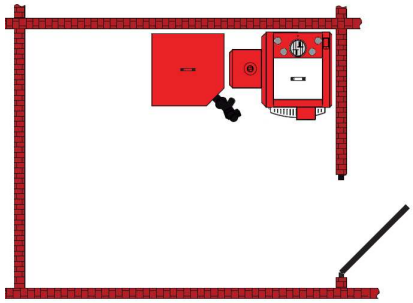
Installation – burner on the right side





Installation – burner on the left side





Normally, the boiler is produced with burner on the right side, but it could be easy installed on the left side, if it is necessary.

It is forbidden to install the boiler in living rooms, corridors, etc.

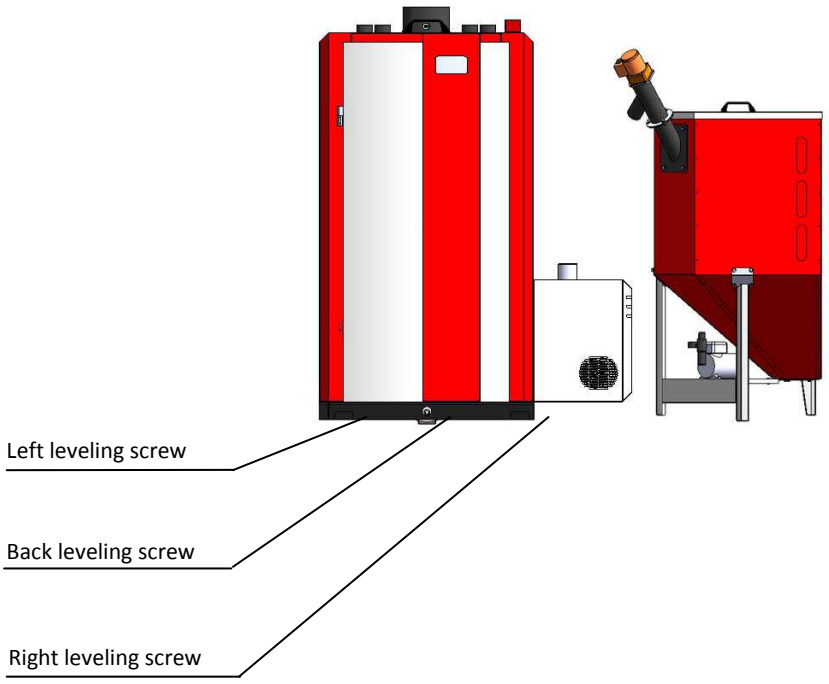
2. Installation of pellet boiler „CL 35”

2.1 **Transportation of the boiler to the client**:

The transportation of the boiler should be done in a reinforced vertical position in the original packing and transport pallet, in order to avoid transport damage of the level system and the external covers.

2.2. **Transporting to the technical room** should be done by using a pallet truck with the original transport pallet. In the technical room this pallet should be removed and the boiler could be moved on a wheel, mounted on the back side of the boiler.

2.3. **After the boiler and the storage tank are placed in the technical room, both units should be leveled, using the leveling screws, showed on the scheme below**:

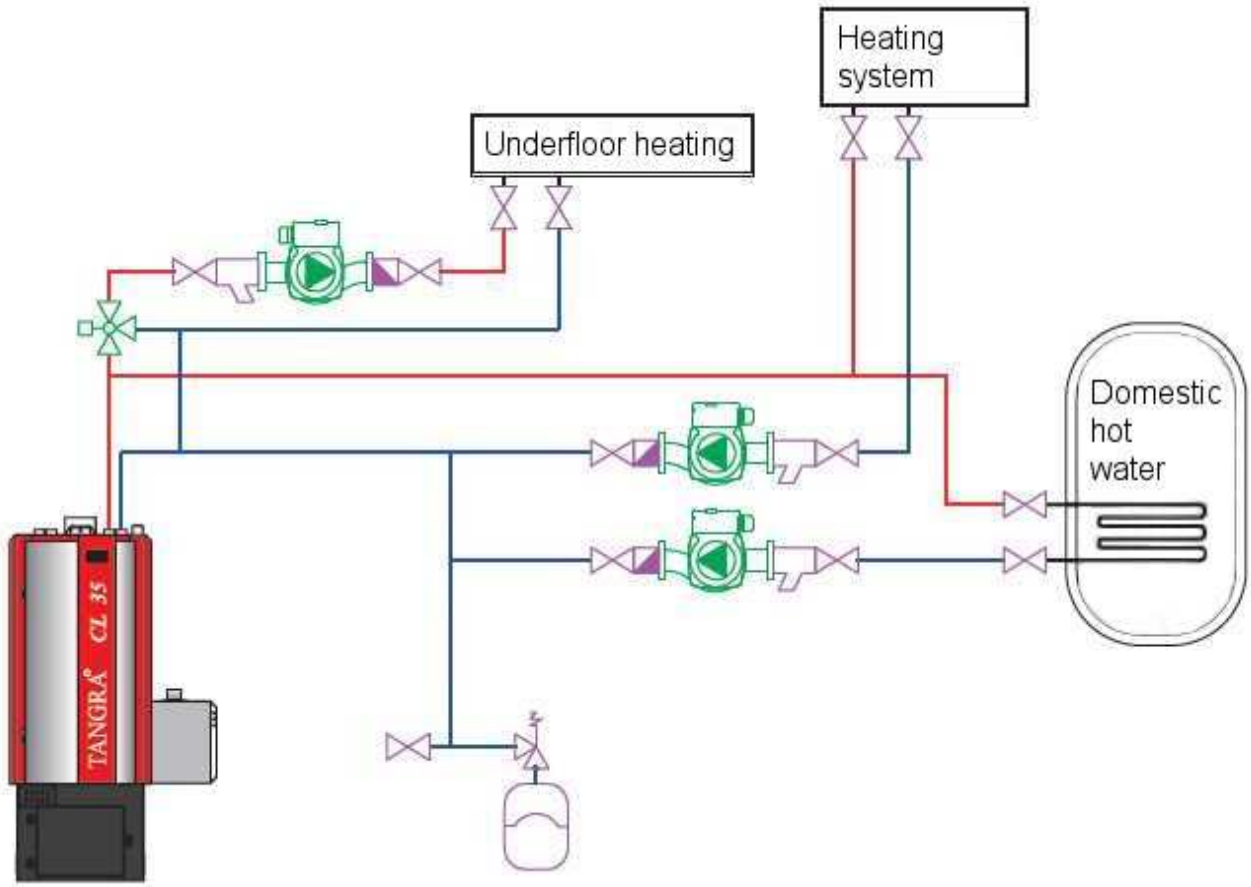


It is forbidden to install the boiler in the technical room on the transport pallet!

The boiler could be installed directly on the floor, which is made of non-combustion materials or previously reinforced if required.

3. Hydraulic and electrical schemes. Configuration for installation.

3.1. Hydraulic scheme

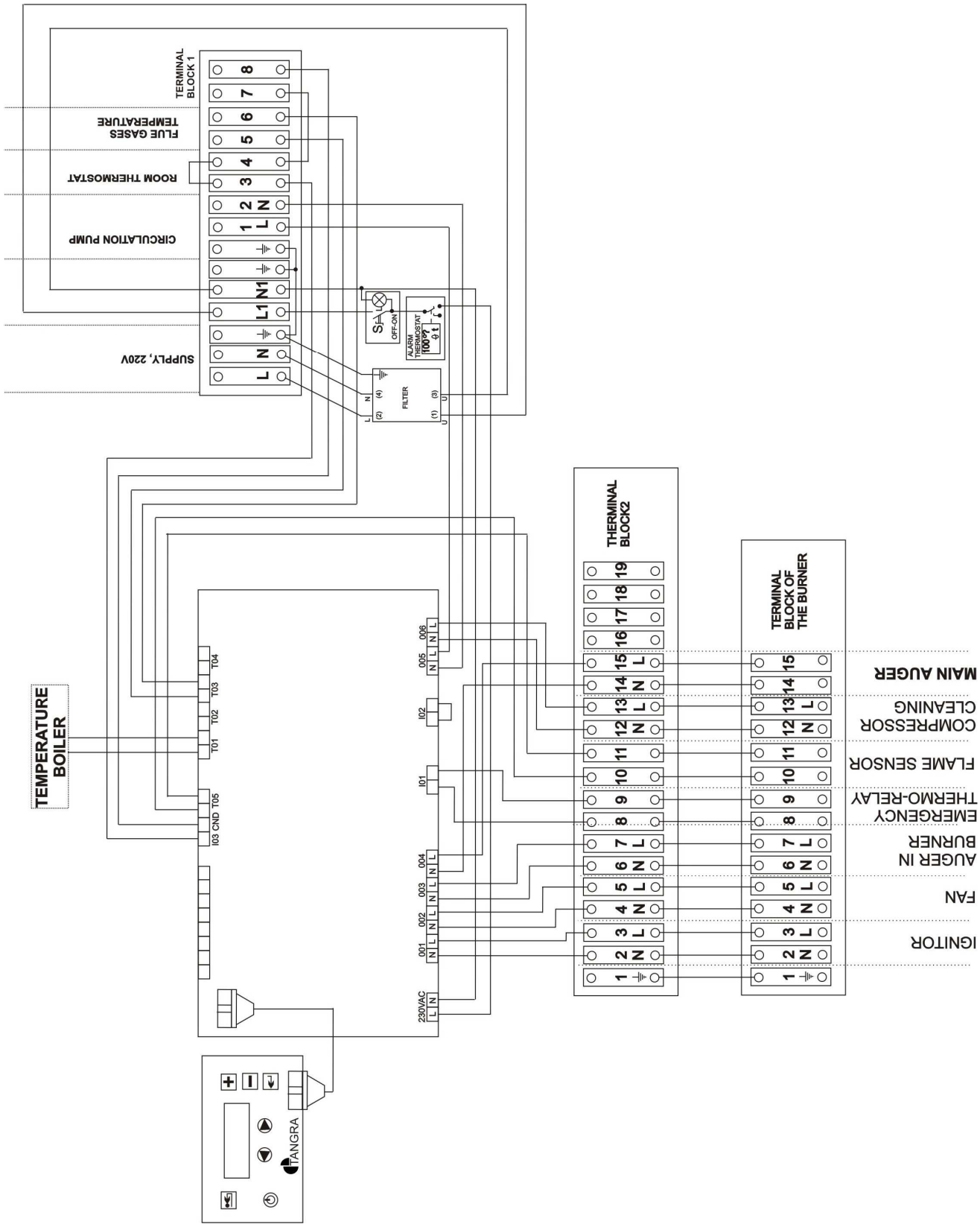


3.2. Electrical schemes

Connection to the electrical system should be made by qualified specialist according to BDS EN 60 335-1/1997

Main electric supply 230V/50Hz is fed on terminals L, N и PE. It should be connected by hard connection and separate safety fuse.

It is not allowed to use Schuko plug or other type.



As standard, the controller has one output for control of one circulating pump. In case you install more than one pump, should be used additional control panel, which is available as an option to the boiler.

Parameters

Table with all recommended values on page 16

Digital inputs

Analog inputs

Digital outputs

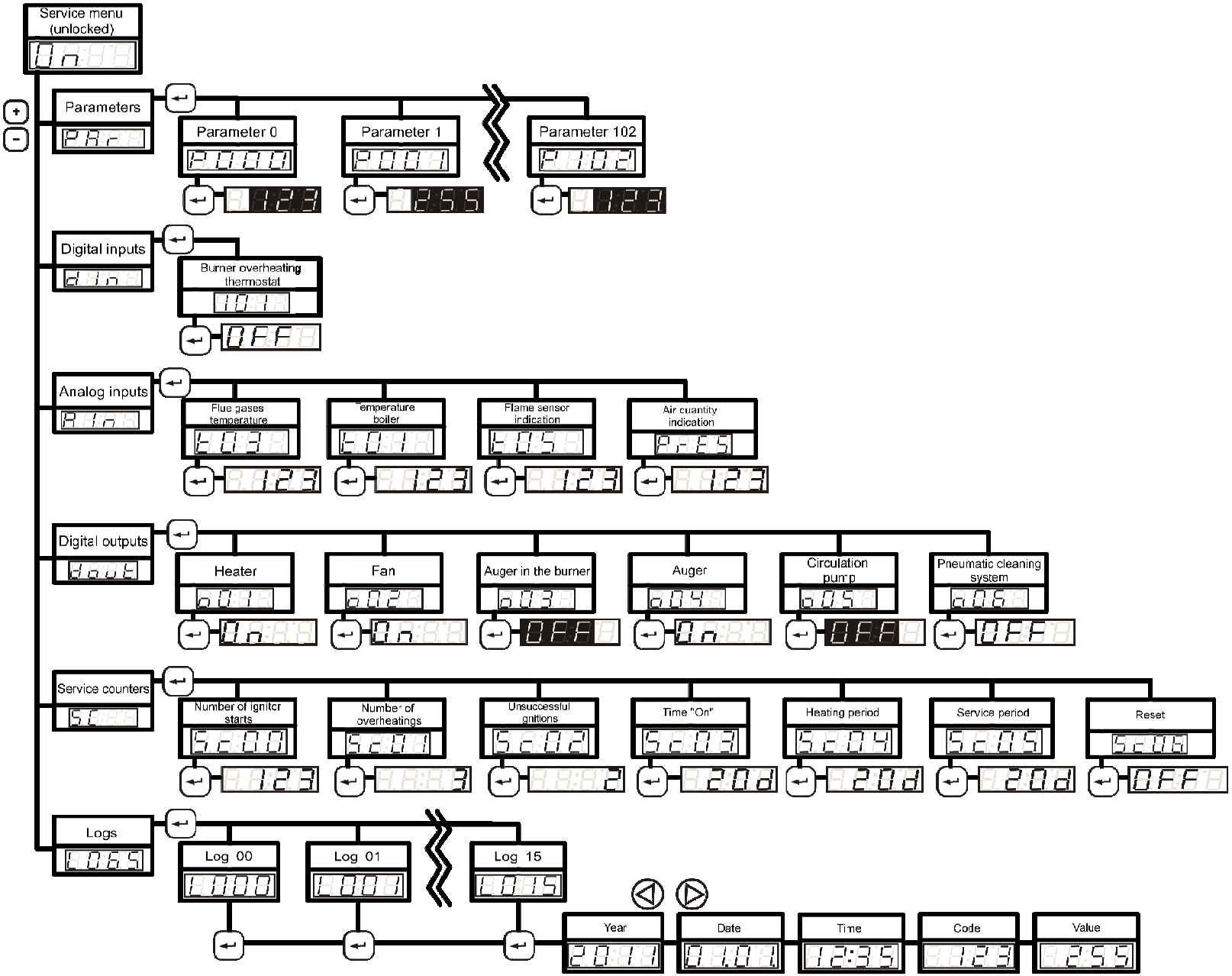
Every output of the controller could be acctivated separately for diagnostic and verification. Works only in "Off" mode of burner.

In "On" mode of the burner shows only current values of the outputs.

Service counters

Recorded errors

List with all errors could find on page.



Възможни грешки:

E001-Keyboard error; E004 – Motherboard communication error; E108 – security switch error; E110 – NTC1 error – temperature sensor; E111 – TC1 error – temperature flue gas; E115 – General error; A004 – low battery; A002 – service required; A003 – low air flow

5. Parameters to set the controller

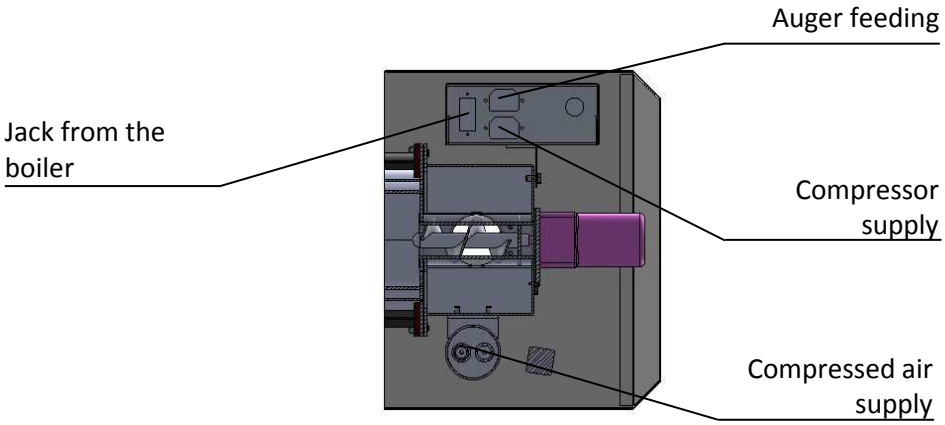
№ parameter	Description	Measure	Limits of values	Recommended values
0	*Maximum wait time for successful firing in ignition phase.*	**minutes**	**1 ÷ 20**	**15**
1	*Maximum acceptable time for flame detection with igniter off in the test fire phase.*	**minutes**	**1 ÷ 5**	**1**
3	*Start Up phase auger OFF time – defines the heater OFF time (no dosing) during the Start Up phase.*	**10 = 1 s**	**0 ÷ 200**	**150**
4	*Start Up phase auger ON time – defines the feeder ON time (dosing) during the Start Up phase.*	**10 = 1 s**	**0 ÷ 200**	**100**
10	*Power 1 auger ON time – working dose at power level 1.*		**10 ÷ 40**	**20**
18	*Power 5 auger ON time – working dose at power level 5.*		**10 ÷ 60**	**35**
19	*Air quantity in Fire down phase.* *After Fire down phase is executed, the fan accelerates to full speed for 20 seconds.*		**50 ÷ 150** **150=max.**	**70**
20	*Air quantity in Test Fire phase*		**10 ÷ 150**	**60**
21	*Air quantity in Start Up phase*		**10 ÷ 50**	**20**
22	*Air quantity in Ignition phase*		**10 ÷ 50**	**20**
24	*Air quantity at power 1.*		**10 ÷ 50**	**20**
28	*Air quantity at power 1.*		**10 ÷ 150**	**60**
50	*Temperature difference between T_{given} and $T_{current}$, by reaching of which the controller starts fire up.* ***Example**: if T1=65°C and parameter 50=10°C, the boiler will restart at T1=55°C.*	**°C**	**5 ÷ 20**	**5**
51	*T_{given} – required water temperature in the boiler. When T_{given} is reached, the controller starts smooth reduction of burner power from level 5 down to level1 and at [T_{given}+5°C] the burner is switched off.* ***Example**: if T1 is set to 65°C, the boiler will stop completely at 70°C.*	**°C**	**50 ÷ 82**	**65**
55	*Gasses modulation start temperature - flue gasses temperature threshold, when the controller begins to decrease the burning power, independently from the water temperature in boiler.*	**°C**	**150 ÷ 200**	**180**
57	*Alarm triggering gasses temperature:* *If the flue gasses temperature is higher than [PAR57*2], the Alarm Gasses is reported and the controller switches off the system.*		**100 ÷ 150**	**125**
60	*Time between two blow cleanings.*	**minutes**	**0 ÷ 120**	**60**
61	*Blow cleaning period.*	**s**	**10 ÷ 120**	**30**
62	*Air quantity during blow cleaning period:*		**50 ÷ 150**	**100**
67	*Water pump turn on temperature.*	**°C**	**40 ÷ 70**	**55**
68	*Water pump turn off temperature. MUST BE lower than PAR67 value.*	**°C**	**40 ÷ 70**	**50**

№ para-meter	Description	Measure	Limits of the values	Recommended values
70	*Start Up phase duration.* ***OBLIGATORY REQUIREMENT (par.3+par4+par.3)>par.70***	**s**	**30 ÷ 120**	**40**
78	*Flame present detection level - Defines the sensor input for valid flame detection.*		**10 ÷ 200**	**120**
79	*No flame detection level - Defines the lower sensor input level for no flame detection.*		**0 ÷ 100**	**10**
80	*Time delay before OFF detected - Defines the time during which flame sensor detects value under param. 79 before the burner to be stopped and blow cleaning started.*	**s**	**0 ÷ 180**	**60**
82	*Minimal air quantity entering at the burner under which alarm is activated (stuffed chimney, fan failure etc.)*		**1 ÷ 100**	**10**
83	*Time delay before triggering pressure error - Defines the time for air quantity to be under param. 82*	**s**	**0 ÷ 120**	**30**
94	*Time to service warning level - Defines the Time to service due time.*	**weeks**	**0 ÷ 250**	**0**
102	*Freeze protection*	**°C**	**5 ÷ 30**	**10**

6. Start Up the boiler and initial firing.

6.1. Filling the installation, filling with fuel and check the integrity of the unit

- After the installation of the boiler and its connection to the heating and electrical systems, could proceed to filling of the boiler body and heating installation with water. All types of connections inside and outside the boiler should be visually inspected for leaks.
- To ensure enough quantity of pellets, which is needed for initial start of the pellet boiler, ½ of the volume of the pellet storage tank should be filled.
- Verify the position of the ceramic element in the combustion chamber
- Verify of all electrical connections of the burner and the flexible pipe for compressed air.
- Scheme for supply the burner and the compressor:



Burner – view from below

After inspection turn the supply on, using the main switch.

6.2. Initial Startup

6.2.1. Initial feeding of the auger:

- Take off the flexible connection for pellets from the burner;
- From menu Setup choose level [6] (Manual feeding) – The initial feeding of the auger with fuel and hold the button Enter, until the main auger is filled with fuel and the flow become stable.

6.2.2. Set the capacity of the boiler:

- From menu Power choose Auto;
- Remove the plug of the main auger of the burner;
- Press and hold the button on/off, until on the display is On;
- Wait minimum 60 s.;
- Place a plastic bag at the end of the flexible connection;
- Take out the flame sensor;
- Connect the plug of the main auger to the burner. After 60 s the main auger will turn on;
- Measure the quantity of pellets, passed through the main auger for 6 min. This quantity, multiplied by 10 gives the amount of fuel in kg/h.

Capacity, kW	12.5	15	17.5	20	22.5	25	27.5	30	35
Fuel, kg/h	2.6	3.1	3.7	4.1	4.7	5.2	5.7	6.2	7.4

- Press and hold on/off button, until the display shown Off;
- Return the flame sensor. After 60-120 s the boiler will terminate loop of self-cleaning of the burner;

  If you want to change the capacity in Auto mode (highest capacity), enter in menu Setup, level Parameters, change parameter 18, in proportion with what we want to achieve and repeat, to establish the capacity.
  Use the same procedure to set capacity 1. To set the fuel use parameter 10. *We do not recommend capacity under 17kW.*

- The rest of the capacity levels (2, 3, 4) will be automatically calculated by the controller.
- Connect the flexible connection for pellets to the burner.

6.2.3. Measure the draught in the chimney:

When the boiler is not working, measure with suitable device (gas analyzer, differential manometer) the draught at the end of the chimney, using probe M12. The draught should not be less than 15 Pa. The operation of the boiler with less draught than 15Pa could lead to overheating or fire in the burner.

6.2.4. Initial Start Up of the boiler:

- When we are sure, that all connections are correctly installed, the quantity of fuel for the lowest and highest capacity are checked and there is enough draught in the chimney, we can start the boiler from on/off button.

- From menu Temperature set the water temperature in the boiler (example75^{o}C).

- From menu Power, set Auto. The boiler will work with maximum capacity, until it reached the set temperature 75^{o}C , than will star modulation of the capacity, from higher to lower and will turn off at 80^{o}C

- When the boiler starts, the control light, placed next to the start button, blinking. That means, that the boiler is in ignition mode. When appeared a stable flame (3-10min), the boiler turn into working mode and the lamp light up permanently.

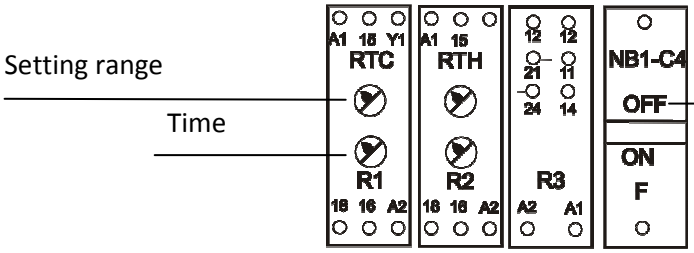
- After reaching minimum 50 ^{o}C of the water in the boiler, the burning process could be set using gas analyzer. The parameter which control the air quantity at higher capacity is 28, and at lower capacity – 24 (check the table with parameters). Recommended values: CO – ≤100 ppm; O_2≤4-8%; λ = 1.3 – 1.6; $T_{flue\ gases} \leq 180_{o}$C.

- Repeat this procedure to set the air quantity, turning to the lowest capacity (1). Try to reach the same values of gas analyzer.

6.2.5. Set the system for forced cleaning – with the system for forced cleaning of the burner, we could set the maximum time between to cleanings, regardless if the boiler reached its set temperature.

RTC (R1) – impulse relay to set the duration of work between two cleanings (recommended values – from 30min to 10 hours, depending of the quality of the pellets).

RTH (R2) – impulse relay to set the time, when the boiler is in Off mode, to made this cleaning process (recommended values – from 5 to 10 min).



Position **OFF** – forced cleaning system work.

Position **ON** – system is shunted. The boiler does not perform forced cleaning.

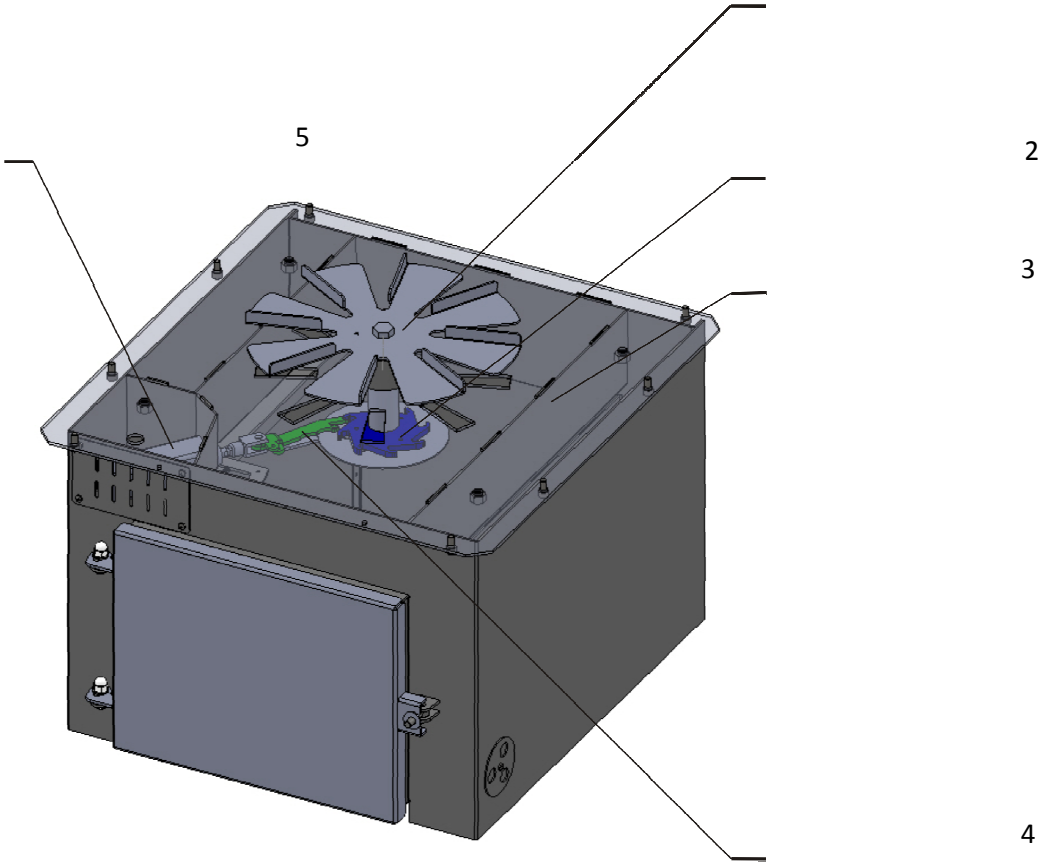
Working principle – the system for forced cleaning receive signal from the ignitor. When the ignitor turn on , RTC (R1) goes into RESET, constant light signal. After the light signal from the burner is off, starts counting of the set time, the lamp is blinking. After the set time is over, the boiler turn off and relay RTH (R2) count the time needed for the cleaning process. After the set time of relay RTH (R2) is over, the boiler turn on and repeat the process.

6.2.6. Set the temperature in the boiler:

- From menu Temperature set the water temperature in the boiler. When the boiler reaches this temperature, it will turn automatically in modulation mode and after 5^{o}C will turn off.
  Example: set 65^{o}C water temperature, the boiler will slowly decrease its capacity and when it reaches 70^{o}C turn off.
- Automatic start up - when the boiler reached the temperature (cooling of the water in the boiler) to Twater=Tset – Parameter 50, the boiler will start automatically the ignition procedure.
  Example: if set temperature is T_{set} =65^{o}C, and parameter 50=10^{o}C, the boiler will start automatically the ignition if temperature T1=55^{o}C.

7. Ash collector (option)

The ash collector allows continuous work of the boiler (1-2 months), when the cleaning of the combustion chamber is not necessary. Work as a part of the self-cleaning system. A cycle of increasing the pressure in the receiver of the system is performed. The pneumatic cylinder, which control the operation ot the ash collector, moves and throw the ash in the container. The volume of this ash collector is enough to collect the ash made by 2-3 tones of pellets (depend of the pellet quality). We do not recommend the use of this device with pellets, which form a lot of slag – contains inert materials (sand, soil, clay). The lumps could mechanically block the operation of the device.



1) Diaphragm;
2) Working wheel;
3) Ash container;
4) Rod;
5) Pneumatic cylinder

For any problems, please contact your Installer!!!
Do not try to fix the problem alone!!!

NOTES

NOTES

TANGRA®

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